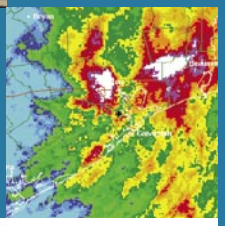
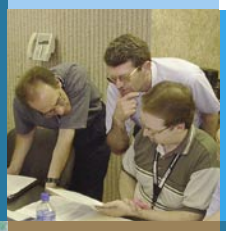
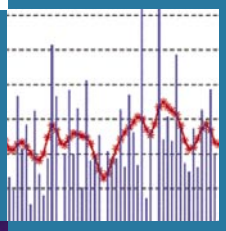
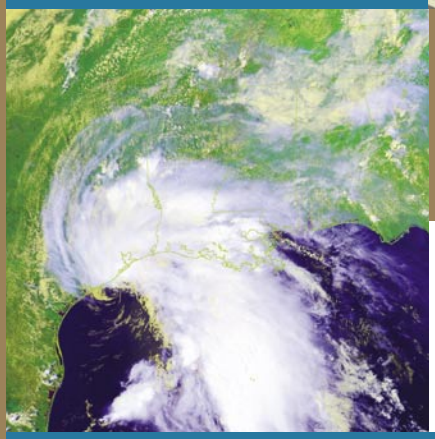
2001 THE NATIONAL CLIMATIC DATA CENTER

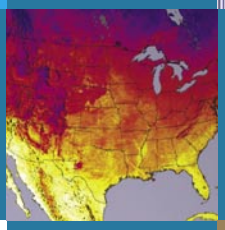


Celebrating 50 Years of Excellence NCDC 1951-2001









1951-1995

Post 1995

Department of Commerce
Donald L. Evans, Secretary

National Oceanic and Atmospheric Administration
Vice Admiral Conrad C. Lautenbacher, Jr., USN (Ret.),
Under Secretary for Oceans and Atmosphere and NOAA Administrator

National Environmental Satellite, Data, and Information Service
Gregory W. Withee, Assistant Administrator

National Climatic Data Center
Thomas R. Karl, Director

THE HISTORY AND DIRECTORS OF NCDC

Modern climatology owes much to Thomas Jefferson, who recognized a need for systematically recording the climate of the United States. In view of his prominence and lifelong enthusiasm for climatology, it is difficult to understand why nearly a full century elapsed between publication of his first climatological notes and the emergence of a firm framework to survey this vital natural resource. There was no organized system of taking weather observations until the 19th century, when successive advances were made by agencies of the Federal government. The United States Weather Bureau, created in 1870 under the United States Signal Service (later Signal Corps) was made a civilian agency and transferred to the Department of Agriculture in 1891. The Act of Congress effecting this change charged the Weather Bureau, among other duties, with "... the taking of such meteorological observations as may be necessary to establish and record the climatic conditions of the United States..."

William H. Haggard
1966 - 1975

Thomas D. Potter
1975 - 1976

Daniel B. Mitchell
1976 - 1982

The new civilian Weather Bureau inherited an operating Climatological Service. Government operated stations numbered about 180 but the bulk of data used to establish the climate came from public-minded citizens who volunteered to record temperature extremes and daily amounts of precipitation. There were more than 2000 of these cooperative stations at the time. These surface observations from land stations grew in number, as did the collection of ocean and upper air observations. By the late 1920's data holdings in Weather Bureau files had reached staggering proportions. The New Orleans (LA) Tabulation Unit was established during the early stages of World War II with the primary responsibility of conducting climatological investigations as requested by the Armed Forces. The Federal Records Act of 1950 established the National Weather Records Center (NWRC) as the official depository of all United States weather records. In July 1951, approval was granted to form the center in Asheville, NC.

Leslie Smith
1952 - 1958

Ray L. Fox
1958 - 1962

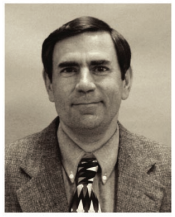
Gerald L. Barger
1962 - 1965

By 1952, the move from New Orleans was completed. Through an understanding with the National Archives, NWRC was the collection center and custodian for all weather (climatological) records of the United States. The World Data Center (WDC) system for international exchange of scientific data related to the physical environment of the earth was established to ensure the permanent availability of the worldwide observations taken during the International Geophysical Year, 1957-58. The WDC-A for Meteorology was collocated at the NWRC to assist scientists who need unique data not available from the regular sources covered by intergovernmental arrangements under the auspices of the World Meteorological Organization (WMO).

The Weather Bureau's regional processing units were consolidated at the NWRC during late 1962 and early 1963 as a measure to increase the economy, efficiency, and effectiveness of the overall program. In June 1970, the facility's name was changed from the NWRC, to the National Climatic Center to more truly reflect its functions as the world's largest center for climatic data. In October 1970, the National Oceanic and Atmospheric Administration (NOAA) was formed. Two years later, the Center began archiving and servicing data from environmental satellites. The National Climate Program Act of 1978 established a Climate Service System with a renewed emphasis on local, state, regional and national aspects. A name change in 1984 brought forth NCDC, the National Climatic Data Center.

L. Ray Hoxit
1982 - 1984

Kenneth D. Hadeen
1984 - 1997



Thomas R. Karl
1997 - Present

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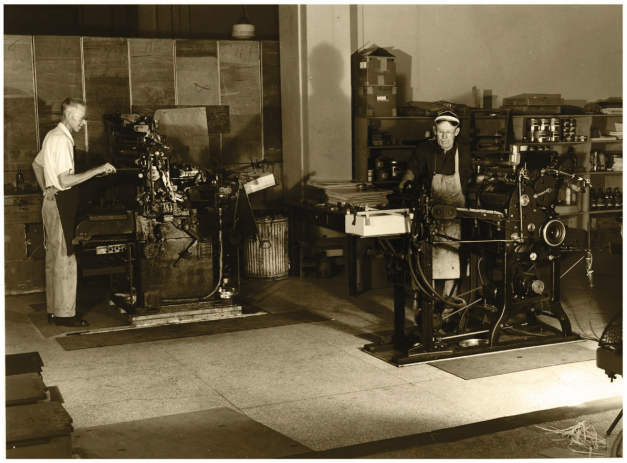
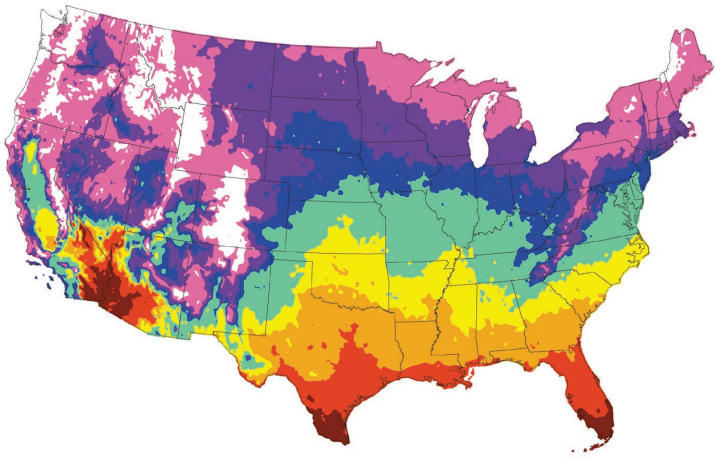
2001 MISSION ACCOMPLISHMENTS





Contents

FEATURES

Foreword

The NCDC has enjoyed an extremely productive and very successful year in 2001. The Center marked its 50th Anniversary in October as we continued to provide excellent weather and climate data products to a Nation that relies on the Center to assist with national security, protection of property, public safety, and sustained economic development.

We, as an organization, have been entrusted with a challenging and important mission for all Americans:

the responsibility for the stewardship and access to the Nation's climate-related data and information, as well as monitoring the national and global climate.

As we continue to look forward to the opportunities of the future, the Center will continue to build partnerships with national and international agencies and organizations, as well as our contract partners, to deliver the best environmental data sets and products possible. In 2002,

- *We will continue to operate and modernize the World's premier environmental data center, fulfilling our customer's requirements for quality data provided in a timely manner.*

- *We will implement a national Climate Reference Network (CRN).*

- *We will collaborate with other agencies and organizations to describe changes to our climate and the implications of those changes.*

- *We will strengthen and expand collaborations with other NOAA offices to implement NOAA's environmental prediction and stewardship responsibilities.*

- *We will foster understanding of the value of our information to stakeholders and partners in the media and private sector.*

- *We will deliver state-of-the-art products and services based on cutting edge operations, science, and applications.*

- *We will continue to develop and maintain a world class, diverse, dedicated, and skilled workforce through teamwork, motivation, and training.*

With the Center's talented and dedicated workforce, and the opportunities before us, the future is bright. I personally look forward to 2002 as we move into our next fifty years.

Thomas R. Karl
Director

NCDC MANAGEMENT AND STAFF

Thomas R. Karl
Director

Sharon LeDuc
Deputy Director

Michael Crowe
Science Planning Officer

Benjamin Watkins
Operations Planning Officer

John A. Jensen
Program Manager, Climate Reference Network

Stephen R. Doty
Program Manager, Climate Data Base Modernization

Scientific Services Division

David R. Easterling (acting)
Division Chief

Russell S. Vose
Climate Archaeology and Analysis Branch

Jay H. Lawrimore
Climate Monitoring Branch

Marc S. Plantico
Product Development Branch

Climate Data Division

Wayne M. Faas
Division Chief

Arthur G. DeCotiis
Data Ingest and Processing Branch

August L. Shumbera
Active Archive Branch

Climate Services Division

Peter M. Steurer
Division Chief

Vernell M. Woldu
Customer Services Branch

J. Neal Lott
Data Access Branch

Charles F. Carpenter
Satellite Services Branch

Support Services Division

Robert L. Money
Division Chief

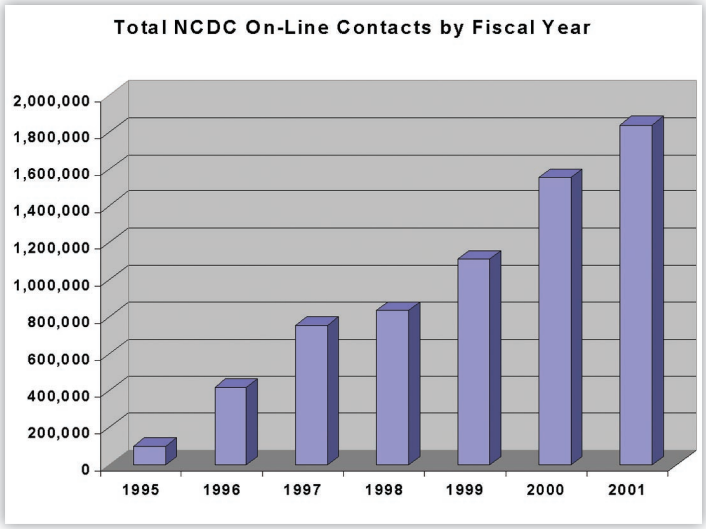
Kendra L. Tarver
Systems Branch

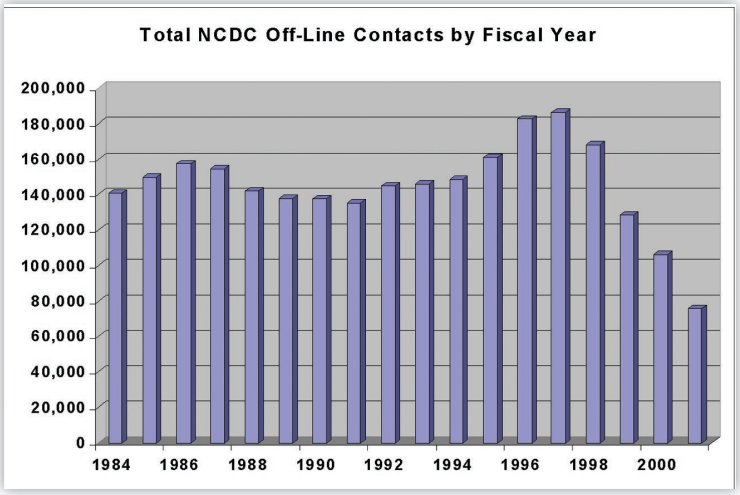
Pamela Y. Hughes
Mission Support Branch

CLIMATE SERVICES

LEVERAGING E-GOVERNMENT

NCDC continued to show a dramatic shift to online ordering of climate data and products in FY01. By the end of FY01, online data sales increased 30% - to more than $600K - compared to FY00. In addition, online orders totalled more than 60% of all orders with more traditional offline orders totaling less than 40%.





NCDC has improved customer service efficiency dramatically. Due to online web access, the timeliness of ordering NCDC data and products was reduced from five days in FY95 to less than one day in FY01. By transitioning the delivery of climate data and products to the web, NCDC has effected a major cost reduction in servicing customer requests. In FY95 almost 50 government and contractor employees serviced customer requests; in FY01, a total of 35 employees were required for this same function.

ONLINE ORDERING OF CERTIFIED WEATHER RECORDS

A new E-commerce module was added to the NCDC Online Store allowing customers to purchase Certified Data online. Most states require that all records submitted as evidence in a court of law be certified. The certified data includes weather observation forms, summary publications and products, and weather charts. To transition this requirement for certification to the goals of E-government, NCDC made it possible to purchase online certified data at a price of $52.00, discounted from the usual offline rate of $60.00. Orders are still filled and shipped offline until such a time as court approval is granted for certifying data for online delivery. This system should prove very popular for customers and result in a decrease in the number of telephone calls received for certification orders.

FORM CD-64
(Revised)
Prescribed by
D.A.O. 201-17

U. S. DEPARTMENT OF COMMERCE

Asheville, N.C.

I CERTIFY that the attached are authentic and true copies of meteorological records on file in the NATIONAL CLIMATIC DATA CENTER, ASHEVILLE, NORTH CAROLINA.

for
AUGUST L. SHUMBERA
RECORDS CUSTODIAN
DATA ADMINISTRATOR
(Official Title)

I HEREBY CERTIFY that AUGUST L. SHUMBERA RECORDS CUSTODIAN, who signed the foregoing certificate, is now, and was at the time of signing, DATA ADMINISTRATOR, NATIONAL CLIMATIC DATA CENTER, and that full faith and credit should be given his certificate as such. I further state that I am the person to whom the said custodian reports.

IN WITNESS WHEREOF, I have hereunto subscribed my name and caused the seal of the Department of Commerce to be affixed OCT 1 1 2000 on this date:

For the SECRETARY OF COMMERCE:

for
THOMAS R. KARL
DIRECTOR
NATIONAL CLIMATIC DATA CENTER
(Certifying Officer)

THE EVOLUTION OF CLIMATE SERVICES

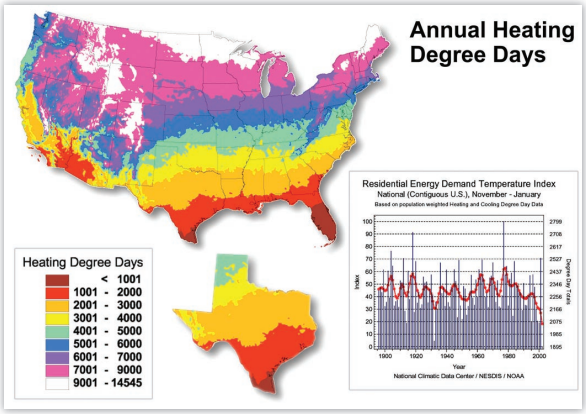
In all areas of business and government, and even among the general public, there has been an ever-increasing awareness of climate change, especially in the last 10-20 years. Never before have people been so aware of the impact of the environment and climate variability on the quality of life and the economic health of a Nation, its citizens, and the population of the world. Government and business decision-makers who are formulating long range strategic policies and plans require data of the highest quality and dependability. This growing 'user community' has increasing expectations of receiving very current information of excellent quality very quickly.

In March 1936, a Works Progress Administration (WPA) project was assigned to the Weather Bureau to tabulate five million weather observations to formulate the Weather Bureau's "Climatological Atlas of the Oceans." During World War II, all United States observational weather records were forwarded to this Tabulating Unit, which was then in New Orleans, Louisiana. In the early 1950's, the complete operation was moved to Asheville, North Carolina ,and designated the NWRC. During the 1950's and 60's the NWRC continued to process "enormous" -- by the standards of that day -- volumes of observational records. These data were processed for "national civil requirements." The NWRC prepared routine publications and conducted special studies for other government agencies, industry, and educational institutions. The NWRC also performed climatological studies under contract for the United States Navy and pursued scientific research.

During the 1970's, and 80's, there was growing concern that the Earth's climate was changing. This concern increased the demand for timely, accurate, and complete data for research and analysis. In 1978, Congress passed the National Climate Program Act. This act established a program which was to include "assessment of the effect of climate on the natural environment, agricultural production, energy supply and demand, land and water resources, transportation, human health, and national security." This program was also to include "global data collection and monitoring and analysis activities to provide reliable, useful, and readily available information ... systems for the management and active dissemination of climatological data, information, and assessments ... and mechanisms for intergovernmental climate-related studies and services."

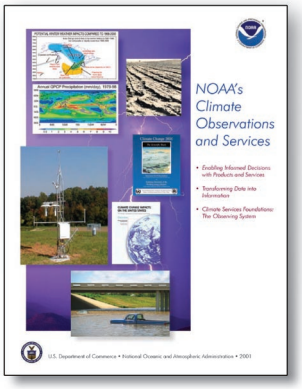
The mission of NCDC is in large part focused on stewardship and access to the Nation's climate-related data and information, as well as monitoring the national and global climate. Because of its resources, NCDC is in an excellent position to advance the science of providing the most reliable information possible related to changes and variations of weather and climate, including its extremes. Not only are NCDC's data of the highest quality, but the health of the world's observing networks will soon be monitored to ensure their continued quality. The amount and diversity of NCDC's data bases are also increasing. The growth of information technology and computer systems allows more effective archiving of ever-greater amounts of data from satellites, Doppler radars, automated sensors, and observing networks. In the wake of costly and devastating weather-related disasters like hurricanes, floods, and drought, there is an increased emphasis on climate monitoring.

Climate variations and change are critical environmental issues, which can have profound consequences on the environment and societies. Long-term observations and careful scientific study show that the climate is now changing at a rapid rate. The ability to make judgments concerning the magnitude and the rate of climate change and the attribution to specific causes is dependent on long historical series of reliable climate records. Daily decisions related to planning and design are dependent on these series. Therefore, NCDC is implementing and managing the United States CRN. This new climate-observing network is the first observing network to adhere to the ten principles of climate monitoring endorsed by the National Research Council. CRN fulfills the Nation's need for long-term, high quality climate observations.

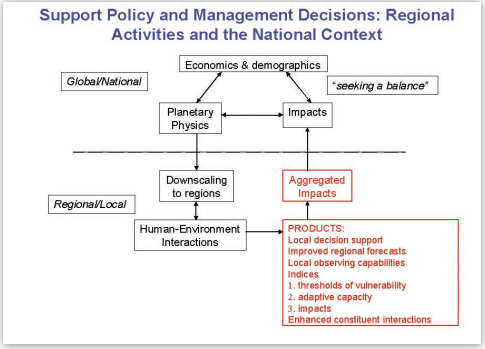


NCDC is able to provide a unique and broad look at the present and past climate. Working with other scientists and experts from governments, universities, industry, and non-governmental agencies, NCDC scientists are able to project future changes in climate at the global, national, and regional scale. NCDC scientists provide scientific leadership, scholarly research, data, and information to these assessment activities. The needs of policy makers dealing with issues affected by global and regional climate change make such in-depth assessments vital to all aspects, impacts, and components of climate change. Some of these assessments address regional vulnerabilities, potential regional impacts, and what Americans can do to adapt to an uncertain and continuously changing climate.

Users accessing NCDC's more than one billion megabytes of data and products continue to increase at rapid rates. Currently, more than four million requests are made each year to NCDC, mainly through the Internet. This number is expected to increase to six million in 2002. In 2001, 82 million files were accessed from NCDC's web site and almost five million megabytes (five terabytes) of data were downloaded. As NCDC leads the way in the area of E-government, it still places a high emphasis on traditional customer service with almost 80,000 telephone calls, letters, emails, and faxes arriving during 2001 requesting information on environmental data.

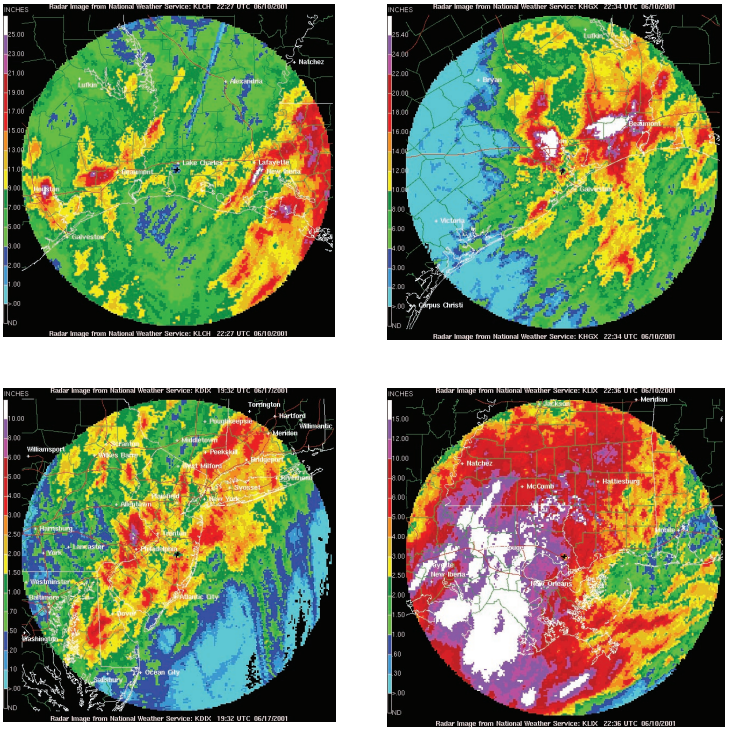


These complex and demanding aspects of climate service require a sophisticated response. Therefore, NCDC and other agencies and departments of government have proposed a comprehensive Climate Services Plan. The goal of NOAA's Climate Services Plan is to bring together data, knowledge, and partnerships (universities, state agencies, and Federal agencies) at all levels to create a climate service system which will apply climate data bases and information for use by decision makers whether it be the general public seeking a retirement home, a small business looking to expand, a multi-national corporation investing in new technologies, or a Federal agency responding to an extreme climate event - a coherent system which improves efficiency for the US economy because of improved decision making through the use of better climate data.



WSR-88D (NEXRAD) - DOPPLER RADAR

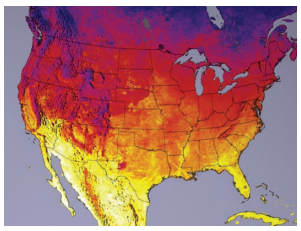
NCDC made extraordinary progress in the ingest, archive and access to WSR-88D data. By ingesting the raw data onto the NCDC mass storage system as it was received (either by tape or electronically), the data are now 10-40 times more accessible, and the number of users has increased significantly. As more sites transmit data electronically, the time to access the data will continue to decrease. Likewise, the data capture rate by electronic receipt improved from 65 to 95%.One of the most significant storms of 2001 was Tropical Storm Allison which caused significant flooding. The Storm Total Precipitation product from NEXRAD estimates the amount of rainfall during the storm. All of these images are contained on the Climate - Watch, June 2001 page at the following url on the NCDC web site: http://lwf.ncdc.noaa.gov/oa/climate/extremes/2001/june/extremes0601.html



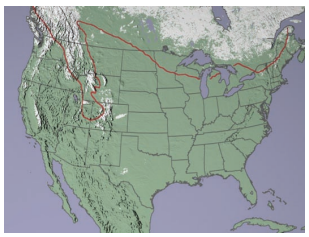
NEXRAD STORM TOTAL PRECIPITATION IMAGES FROM RADAR SITES IN THE RANGE OF THIS STORM: (CLOCKWISE FROM TOP LEFT) LAKE CHARLES, LA, 22:27, GALVESTON, TX, 22:34, NEW ORLEANS, LA, 22:36, 10 JUNE, 2001; PHILADELPHIA, PA, 19:32, 17 JUNE 17, 2001.

NASA EARTH OBSERVING SYSTEM (EOS) LONG TERM ARCHIVE COLLABORATIONS

In July 2001, NOAA and the National Atmospheric and Space Administration (NASA) signed a Statement of Intent to collaborate on the long-term archive of NASA Earth Observing System (EOS) data and other of NASA's related atmospheric and oceanographic data. This SOI, which stems from a Memorandum of Understanding from 1989, calls for NASA's Easth Science Enterprise and NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) to agree that the NOAA / NESDIS Comprehensive Large Array-data Stewardship System (CLASS) shall serve as the national atmospheric and oceanic long-term data archive for datasets such as from the National Polar-orbiting Operational Environmental Satellite System (NPOESS) and the NPOESS Preparatory Project (NPP). NCDC will play a major role in establishing this archive.



MODIS AVERAGE TEMPERATURES DURING NOVEMBER 2001.THE COLDEST TEMPERATURES APPEAR BLACK, WHILE DARK GREEN, BLUE, RED, YELLOW, AND WHITE INDICATE PROGRESSIVELY WARMER TEMPERATURES. (NASA)



MODIS SNOW COVER MAP FOR THE US AND CANADA, NOVEMBER 2001 SHOWS BELOW AVERAGE SNOW COVER FOR MUCH OF THE U.S. THE SOLID RED LINE MARKS THE AVERAGE LOCATION OF THE MONTHLY SNOW EXTENT; WHITE AREAS ARE SNOW-COVERED GROUND. (NASA)

COLLABORATION WITH UNITED STATES GEOLOGICAL SURVEY (USGS) EARTH RESOURCES OBSERVATION SYSTEM (EROS)

NESDIS/NCDC and USGS/EROS expanded their Memorandum of Agreement to permit real-time access to Advanced Very High Resolution Radiometer (AVHRR)

data. The agreement was expanded to include a sharing of facilities for back-up storage. NCDC received 22 pallets of tapes and shipped to EROS 48 pallets of microfilm. This results in a cost savings for each agency.

CLIMATE DATABASE MODERNIZATION PROGRAM

CDMP has a very simple goal: to make major climate databases available via the World Wide Web. Over 1.75 terabytes of climate data are now only a mouse click away. Such access will increase the utilization of climate information. During the year 2001, the modernization program took on many different forms, from imaging and keying weather observations as they were received from the field, to making shoreline data usable in Geographic Information Systems, to imaging historical paper records and books containing climate observations from the United States and around the world. Major advances were made in making these records available on the web through the use of a number of web sites.

WSSRD
web search store retrieve display

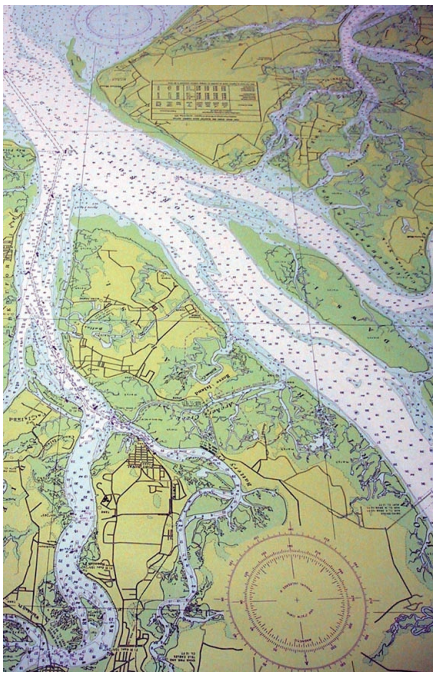
Due to CDMP efforts and earlier projects that imaged historical paper climate records, CDMP was able to make these data available online during 2001. Information Manufacturing Corporation (IMC) of Rocket Center, WV, developed a document management system called Web, Search, Store, Retrieve, Display. This system is more commonly known by its acronym: WSSRD (pronounced WIZARD). WSSRD is housed in a state-of-the-art data center where environmental conditions and security are fully maintained. Hardware is up-to-date and software is user-friendly. By the end of FY01, WSSRD was loaded with over 21 million records covering 21 different data types such as surface airways observational forms, cooperative data forms, climate record books and marine observations.

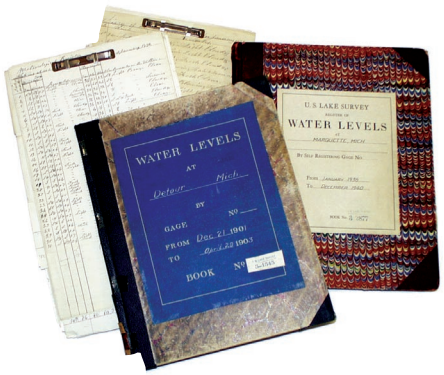
CLIMATE DATABASE MODERNIZATION PROGRAM
Utilizing a National Resource
CDMP

Before CDMP and the WSSRD system, records were stored in the basement of the NCDC. When a request for information was received, NCDC staff located the paper document and the requested information was sent to the customer via fax or mail. CDMP efforts have greatly improved the efficiency of the process. Today these data are online and instantly available. Users without Internet access can contact NCDC through its modern publication subscription and distribution center in Rocket Center, WV. The staff located at this facility will respond to a toll-free telephone number, e-mail, and fax inquiries. A total of seven monthly publications are distributed from Rocket Center: six publications from the NCDC and one from the National Geophysical Data Center (NGDC).

The largest data type contained within WSSRD is the Surface Airways Observational form. These forms date from 1949 to the current month and record hourly weather observations taken from civilian airports and military installations. This data set alone contains over 19 million indices and images. Data are accessible by station name, state, and date. The next largest data set with 765,000 indices and images, and one of the most popular with users, is the set of COOP forms. COOP observers, a network of over 8,000 members throughout the United States, most of whom are volunteers, record daily climate information. These monthly records are imaged and available in WSSRD for the period 1995 to the current month, and are also accessible via NCDC's Online Store system.

Over 30 data related tasks were undertaken during FY01, with four of the five NOAA line offices actively participating in this year's program. These tasks made a variety of climate data more accessible: foreign data journals from the NOAA Central Library and the National Oceanographic Data Center (NODC), shoreline charts from the Coastal Services Center (CSC), historical water levels from the National Ocean Survey and images from NGDC's Defense Meteorological Satellite Program (DMSP).





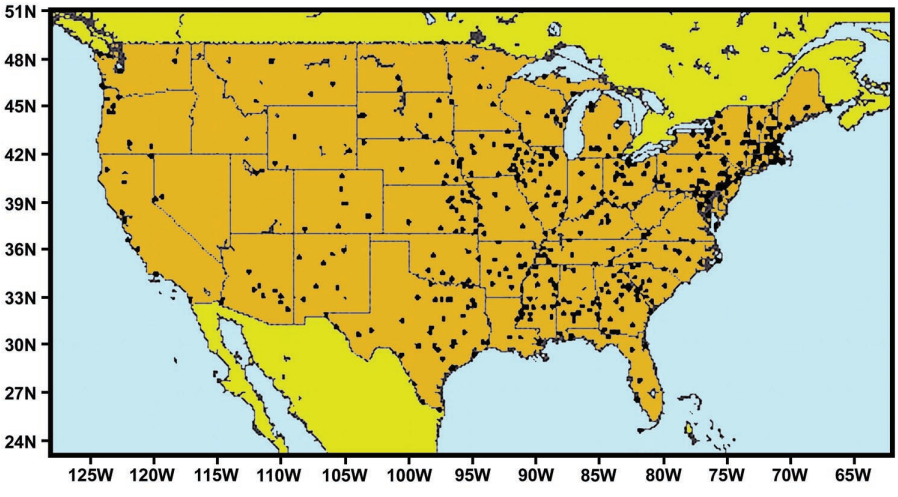
foreign meteorological data summaries. These priceless data documenting the climate of many countries over the past two centuries are being made available on the NOAA Library web site. Other tasks included efforts to modernize lightship data from the coast of America, water level data from the Great Lakes, nautical charts from United States harbors, storm data reports, pre-1890 station history information, and marine meteorological observations from the mid-1800s.

Access to NOAA's collection of data sets is not restricted to WSSRD. Many agencies built or enhanced their own web sites to allow instant access to data and information. The web site of the CSC located in Charleston, SC, provides access to over 5,000 shoreline charts from across the United States. Efforts are currently underway to convert these charts from raster images to vectors. This conversion process will enable the information to be loaded into Geographical Information Systems (GIS) processes.

NGDC in Boulder, CO, is converting photographic negatives of historical data from DMSP film into digital images. The DMSP film details satellite imagery of clouds, snow and ice, fires, and human settlements collected from the early 1970s. These images are being made available online through the DMSP web site. The NOAA Central Library in Silver Spring, MD, is imaging

Scanning paper and film is only one way that CDMP is converting data into digital form. Image Entry (IE) of London, KY, has completed a multi-year effort to key daily observations from 1892 - 1947 from the COOP network. These data were keyed from over 50,000 pieces of microfiche. It took an incredible 2 billion key strokes to create this new data set. Once these data have undergone full quality control and are combined with the post-1948 data, the more than 100-year historical daily climate of the United States will have been fully documented.

To facilitate this vast amount of data imaging, CDMP has established IE in London, KY, as an incoming records processing center. This facility receives paper climate records on a daily basis. Within 48 hours, these paper records are imaged, placed online through WSSRD, and the digital data are transmitted to NCDC for immediate addition to its web-based Online Store system. This quick turn-around time converting paper documents to digital images and data made these records very popular with a variety of users.



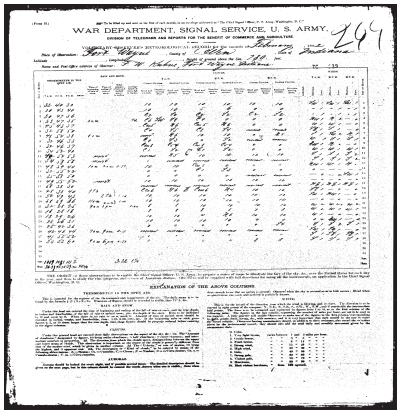
Since 1860, the United States weather observing agencies have compiled Climate Record Books. These books were previously archived on microfilm, subsequently limiting their access. During 2001, Lason Systems, Inc., of Beltsville, MD, subcontractor to SER Solutions, Dulles, VA, imaged the microfilm resulting in approximately 178,000 images being added to WSSRD. Data contained on these images were subsequently keyed. These digital data will be made available in early 2002.

The Federal Government has published climate reports and summaries since the mid-1800s. Over the years, the content, format and style of these publications have changed, while the data continues to be a valuable national resource. In 2001, Lason imaged the full collection of five historical publication series, which documents the climate of states, river basins, and individual cities. These data will be made available in WSSRD early in 2002.

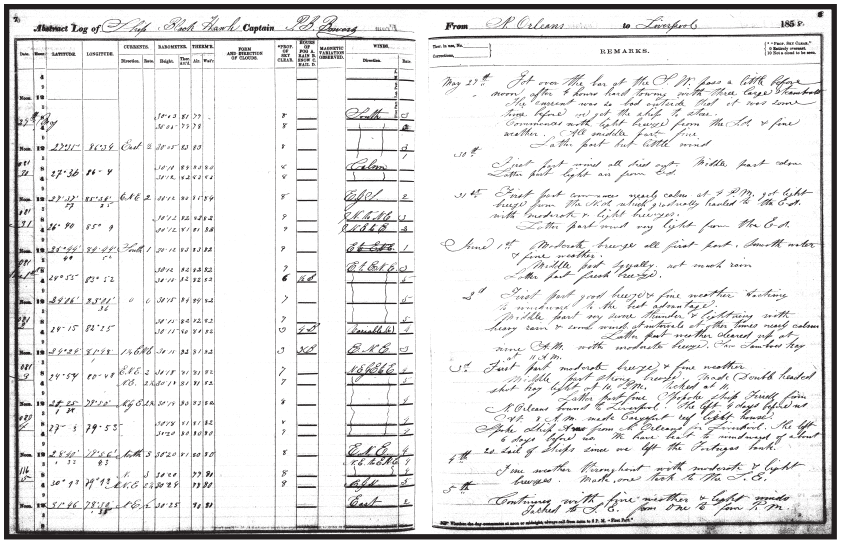
As the American population moved west in the early 19th Century, weather conditions were routinely recorded. In a task, commonly known as the Forts Project, CDMP imaged and keyed Forts data from 600 rolls of microfilm, thereby recording data for over 5,000 locations and observations for various periods of time from the 1820s into the 1890s. Additional original records, currently located in the National Archives in Washington, DC, are slated to be imaged and keyed during the coming year.

Improved access is only one part of the CDMP. The understanding of how and where observations were taken and recorded are equally important. NCDC has station history information documenting how and where observations were conducted, both in digital form and more complete records on paper. To allow the electronic ingest of current information, future expansion, and web access, CDMP has sponsored the complete redesign and implementation of a new station history database. The paper forms are also being made available by inventorying and imaging the 500,000 existing pages.

To understand the parameters under which these original observations were taken, a search was completed to locate pristine copies of the guidelines issued since the late 1800s. Known as Circulars and Federal Meteorological Handbooks, these documents are now being imaged and placed on WSSRD.



Not content to limit climate history to daily temperatures and precipitation, CDMP embarked on a task to digitize hourly observations from 1900 to 1948. These hourly observations contain a variety of data including pressure, winds, weather, visibility, and clouds. In 2001, a priority list of stations was established and work was begun to define keying formats and instructions. Actual keying will begin in 2002.



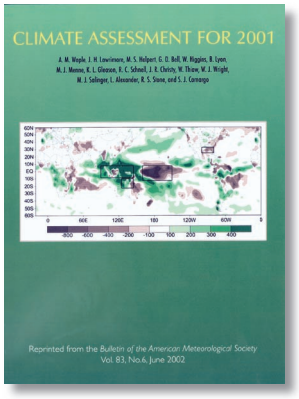
NODC has collected a unique set of ocean climate reports covering the last century. Reports from around the World and in a variety of paper formats have been boxed and shipped to IE for inventory and imaging. This task will make yet another data set, once buried in file cabinets, accessible via the internet.

This year's accomplishments of the CDMP would not have been possible without the efforts of many people throughout the country, all working as part of the CDMP team. By utilizing private sector contractors, the CDMP gained a pool of quality team members, while in-turn providing much-needed employment opportunities in WV, KY, and MD. IMC's development of a streamlined, customer-oriented subscription services center at their facility in Rocket Center, WV, earned IMC employee Ms. Randie Powell the NOAA Team Member of the Month award.

The Nation's Regional Climate Centers (RCCs) also joined the CDMP team this year, lending their expertise to several CDMP projects. They worked in conjunction with IE for the Forts and pre-1949 surface forms keying tasks. The Northeast RCC , located at Cornell University in Ithaca, NY, and the Midwestern RCC in Champaign, IL, provided station selection and keying formats for IE. They will perform quality assurance on these data once the keying is completed.

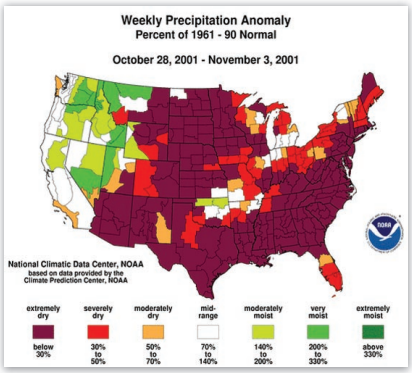
CDMP has proven quite successful, both at creating jobs and in making climate data from across NOAA more accessible. NOAA agencies and the participating partners are working together to serve the American people both now and for future generations. A great deal has been accomplished, yet much remains to be done. The CDMP staff, both public and private, look forward to achieving their goal of a greater utilization of a true national resource for years to come.

CLIMATE MONITORING



CLIMATE ASESSMENT REPORT FOR 2001

NCDC took the lead in authoring the Bulletin of the American Meteorological Society article *Climate Assessment for 2001*.

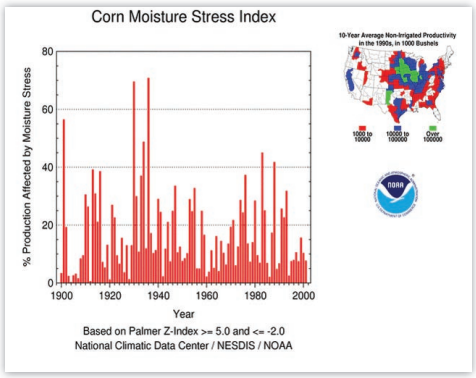


WEEKLY TEMPERATURE AND PRECIPITATION REPORTS

In 2001, NCDC expanded the operational State of the Climate reports to include Weekly Temperature and Precipitation reports as well as preliminary monthly reports which are available by the 5th day of the following month. The production of these reports is primarily automated.

CROP MOISTURE INDEX

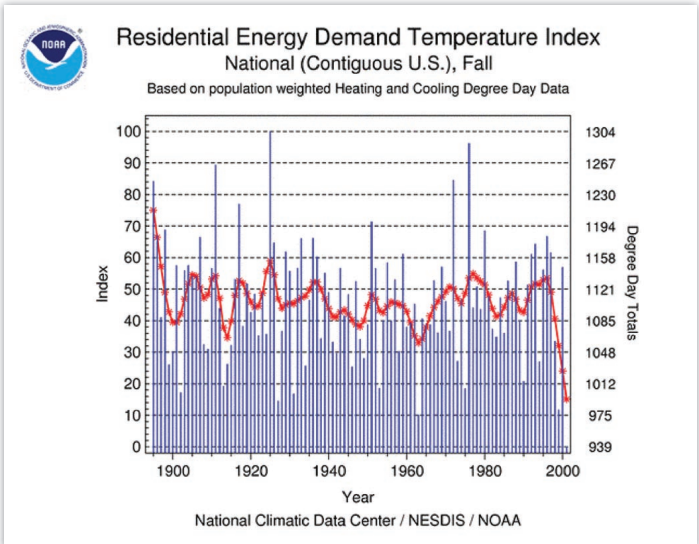
The Moisture Stress Index for corn and soybean crops is a measure of the effects of drought and catastrophic wetness on national crop yield and is calculated through the use of a drought index (the Palmer Z Index) and annual average crop productivity values within each U.S. climate division. Moisture stress, either a lack or an abundance of soil moisture during critical phases of the crop growth and development cycle, affects US average crop yield, particularly when moisture stress occurs in the most highly productive crop growing areas. Soil moisture conditions in July and August were found to be the best indicators of average crop yield for corn and soybeans and, as such, are used in creating the Moisture Stress Index.



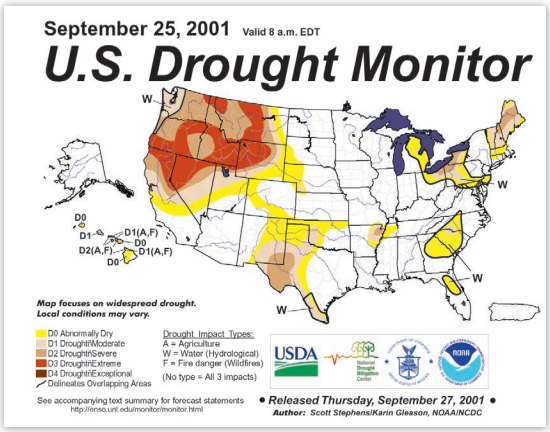
Calculations of the Moisture Stress Index are based on the extent of severe to catastrophic drought or catastrophic wetness within the crop growing regions and the average annual crop productivity of each climate division within the crop growing region. More information can be found at:
http://lwf.ncdc.noaa.gov/oa/climate/research/cie/cmsi.html

RESIDENTIAL ENERGY DEMAND TEMPERATURE INDEX

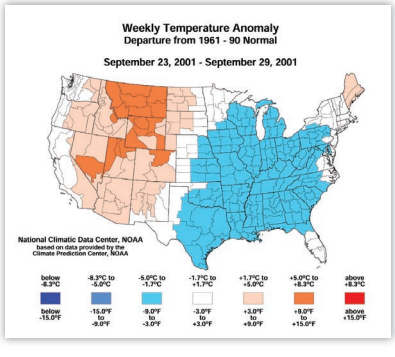
The Residential Energy Demand Temperature Index (REDTI) is calculated to provide retrospective information on the impact of monthly and seasonal temperatures on residential energy demand from 1895 to the present. REDTI is based on heating and cooling degree day totals, population weighted for the Nation. To simplify year-to-year comparisons, the index is scaled from 0 to 100. An index of 100 is assigned to the year with the greatest population weighted degree day average while the year with the smallest degree day average receives an index of 0. More information is avalable at:
http://lwf.ncdc.noaa.gov/oa/climate/research/cie/redti.html



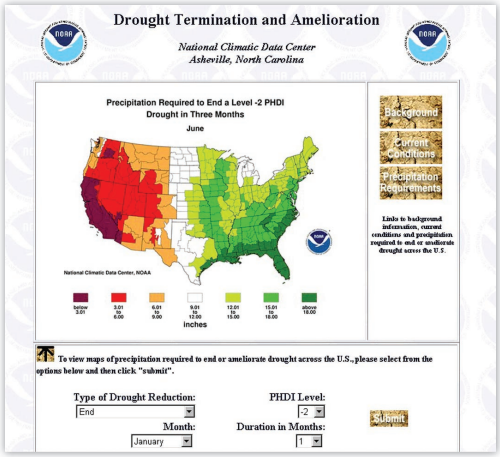
As noted on the Drought Monitor web page:
http://enso.unl.edu/monitor/about.html
no single definition of drought works for all circumstances. The complexity of drought and the large variety of sectors affected by the phenomenon has resulted in the development over the years of many different indices to detect and measure droughts. But no single index works under all circumstances.



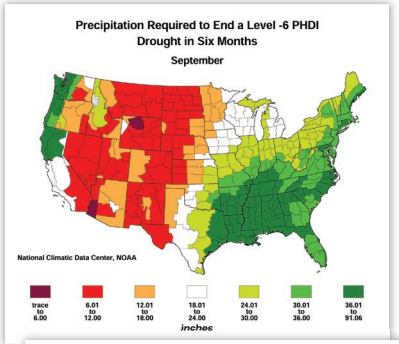
The Drought Monitor was created as a synthesis of multiple indices, outlooks and news accounts, and depicts current drought conditions based on a consensus of Federal and academic scientists. Although initiated before the National Drought Policy Commission (http://www.fsa.usda.gov/indc/) issued its May 2000 report to the President and Congress, the Drought Monitor is an effective example of the Commission's recommendation to "improve collaboration among scientists and managers to enhance the effectiveness of observation networks, monitoring, prediction, information delivery, and applied research."

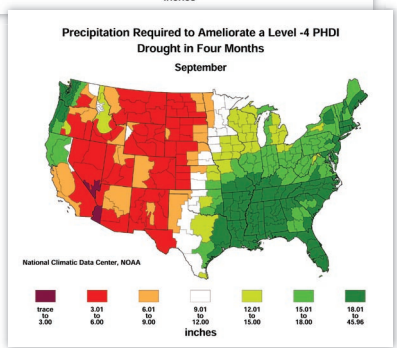


The Drought Monitor is prepared on a weekly basis by Federal and academic partners. The authors rotate from among scientists at NCDC (U.S. Department of Commerce (DOC)/NOAA/NESDIS), Climate Prediction Center (CPC) (DOC/NOAA/NWS), Joint Agricultural Weather Facility (U.S. Department of Agriculture (USDA) & DOC/NOAA), and National Drought Mitigation



Center (University of Nebraska-Lincoln). The authors prepare a map and narrative based on several indicators and input from local field experts. The indicators include such indices as the Palmer Drought Index, Keetch-Byram Drought Index, Standardized Precipitation Index (SPI), satellite Vegetation Health Index, percent of normal precipitation, soil moisture model percentiles, and U.S. Geological Survey (USGS) weekly stream flow percentiles, among many others. The local field experts include the NOAA Climate Diagnostics Center, NWS field offices, USGS, National Water and Climate Center (USDA/ Natural Resources Conservation Service), NOAA Regional Climate Centers, state climatologists, and additional local, state and federal experts.

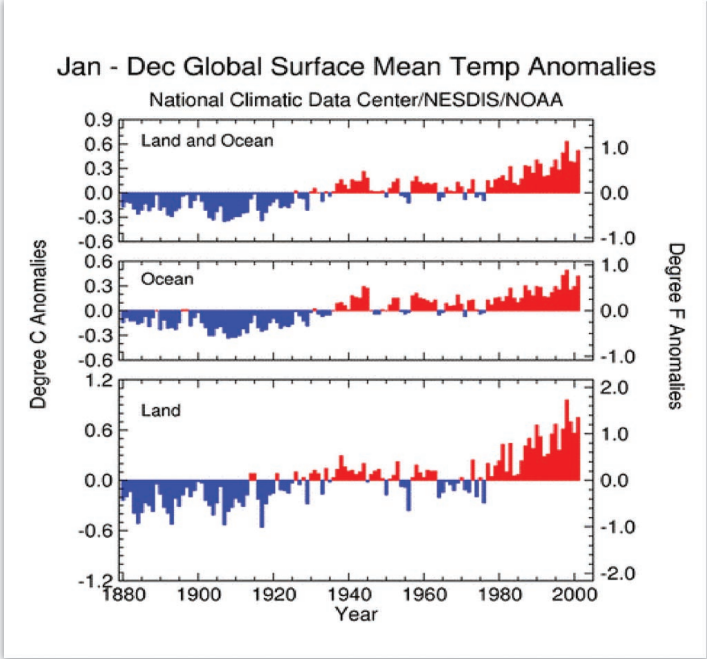




The primary users of the Drought Monitor include the NWS, USDA Farm Service Agency, state water agencies and other resource management institutions and organizations, the Weather Channel and other specialized media, the general media and the general public.

STATE OF THE CLIMATE REPORTS

Calculating all the data, comparing it to past years' data, and presenting it in a way that everyone can understand is a rather complex process - not a simple matter of collecting surface data from around the world and averaging the individual station data into a U.S. or global average.



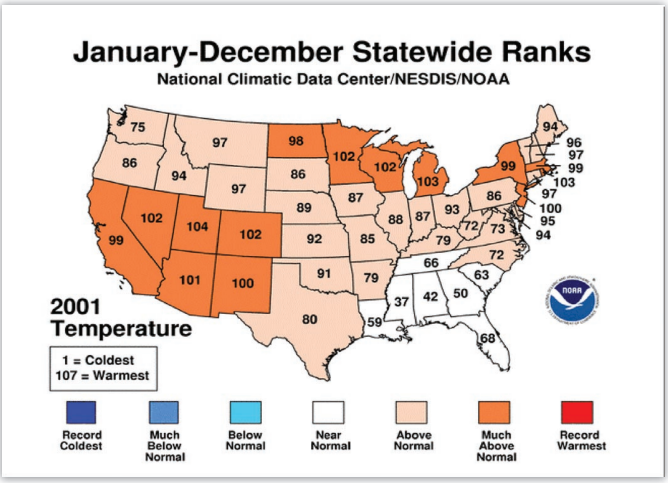
To perform all the analyses necessary for producing NCDC's State of the Climate reports each month, the team of experts at NCDC uses data from the world's largest climate database. An investment in data set development began more than 15 years ago at NCDC to form the basis of NCDC's climate monitoring efforts. Among the essential sources of data is the Global Historical Climatology Network (GHCN), a database containing data from around the world. The United States Historical Climatology Network (USHCN), a database of 1221 high quality stations throughout the contiguous United States, is used as well. Satellite data are also relied upon, including the Reynolds Optimum Interpolated sea surface temperature data set as well as a blended data set of satellite and surface station data.

Monitoring climate conditions around the world in near real-time begins by obtaining the current data. NCDC receives temperature and precipitation data from stations around the world. These data usually arrive during the first five to eight days of each month. The climate monitoring team uses a series of quality control processes developed at NCDC to ensure the quality of the collected data. The data are then merged with the existing data sets.

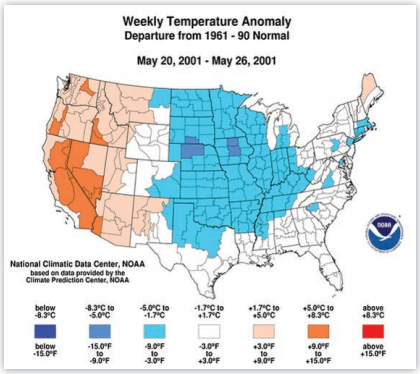
Comparing the current global statistics for land areas with the historical statistics, the team relies most heavily on the GHCN database. This data set contains mean temperature data from more than 7000 stations and monthly precipitation totals for more than 20,000 stations. Some of the data go back to the 1700s, yet the core data are from 1880 to the present time. During the past century, global temperatures have increased approximately 1 degreeF. To ensure that the observed trends and variability are not biased by non-climatic influences, the creation of the GHCN data set, and many of the other data sets at NCDC, have included the development of algorithms for removing artificial biases from the observed record. These non-climatic factors include such things as instrument changes, station moves, and changes in observer practices.

For the ocean areas of the earth, the team uses a historical homogeneity adjusted sea surface temperature data set from the United Kingdom Meteorological Office that contains information from ocean-going vessels dating back to the 1800s. These data, as well as ocean buoy data, are blended with satellite data from NOAA's AVHRR sensor using an Optimum Interpolation technique. To calculate the combined land and sea surface conditions, the team uses a technique for creating a land-sea temperature index.

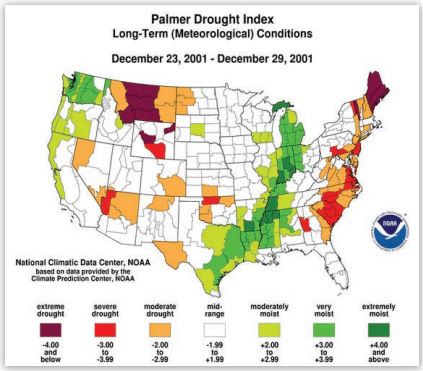
For the United States, the team receives data from several sources, and uses various databases in analyzing current conditions and placing them in historical perspective. NCDC works with CPC in rapidly acquiring data from sources such as the Nation's 13 river forecast centers and the Nation's Snotel (automated system for collecting snowpack and related climatic data in the Western U.S.) sites. Data are also received from approximately 900



Automated Surface Observing System (ASOS) stations. Of these, about 250 are NWS first order stations; the remainder are predominately military stations and small airport sites. The near real-time data are combined with NCDC's Climate Division Database, as well as NCDC's USHCN database using a first difference technique developed at NCDC, to place current climate conditions in historical perspective.

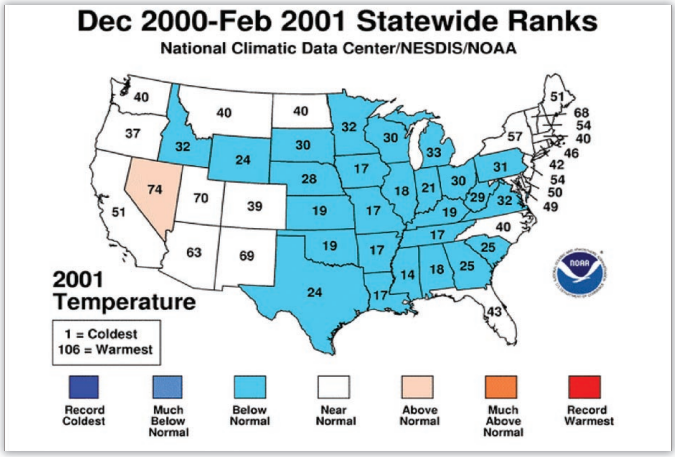


In addition to monitoring the global and national climate, NCDC's climate monitoring team is closely monitoring drought conditions in the United States. The team is working with the USDA, the National Drought Mitigation Center, and CPC to keep abreast of drought conditions around the nation through the weekly publication of the Drought Monitor.



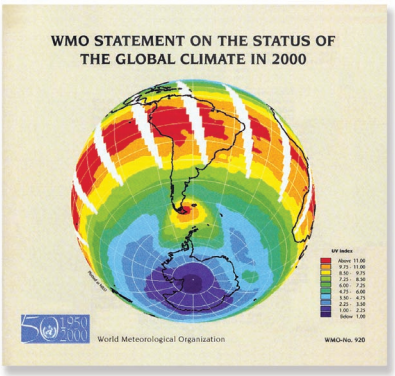
Historical perspective is also provided on current drought conditions throughout the United States each month. These analyses are part of NCDC's State of the Climate reports and contain numerous drought indices and related indicators of drought from the late 1800's to the present. In addition to the Palmer indices other indices such as the SPI are calculated at NCDC. While Palmer's indices are water balance indices that consider water supply (precipitation), demand (evapotranspiration) and loss (runoff), the SPI is a probability index that considers only precipitation. The probabilities are standardized so that an index of zero indicates the median precipitation amount (half of the historical precipitation amounts are below the median, and half are above the median). The index is negative for drought, and positive for wet conditions. As the dry or wet conditions become more severe, the index becomes more negative or positive. The SPI is computed by NCDC for several time scales, ranging from one month to 24 months, to capture the various scales of both short-term and long-term drought.

A credit to NOAA and to the Nation, NCDC's climate monitoring team takes raw data about the climate and turns it into information that we can all understand and use. To see examples of this work, see: http://lwf.ncdc.noaa.gov/oa/climate/research/monitoring.html



NATIONAL AND INTERNATIONAL COLLABORATIONS AND PARTNERSHIPS

STATUS OF GLOBAL CLIMATE REPORT



NCDC supported numerous press releases throughout the year and contributed to various publications and press releases issued by WMO, such as the annual press release on the climate of the year and the publication of the *WMO Statement on the Status of the Global Climate in 2000.*

WMO COMMISSION FOR CLIMATOLOGY

NCDC represented the United States at the Thirteenth Session of the WMO Commission for Climatology (CCl) in Geneva, Switzerland. The WMO meeting was attended by 150 delegates representing more than 90 countries. The NCDC representative was chief United States delegate among a delegation of four. Other delegates from NCDC were appointed posts within the CCl, such as a committee chairperson, the Lead of the Open Program Area Group on The Monitoring and Analysis of Climate Variability and Change, and as a member of the CCl Management Group.

TROIKA ON MONITORING NEAR REAL-TIME CLIMATE EXTREMES

The Canada / Mexico/ U.S. Troika hosted by NCDC was a big success. The results of the workshop included the development of a plan that begins with an annual extremes monitoring product for North America scheduled to be released in time for the *WMO Annual Climate Statement for 2002*. Each country was very enthusiastic about the establishment of this cooperative effort in monitoring and assessing climate extremes, particularly with the prospect of an eventual system for near real-time monitoring across all three countries. NCDC gave a presentation on the current data and product delivery systems, future plans for online data to be added to those systems, the overall data model and requirements for the systems, and the factors and impact of placing the data online.

INTERNATIONAL HAZARD SUPPORT WEB INTERFACE

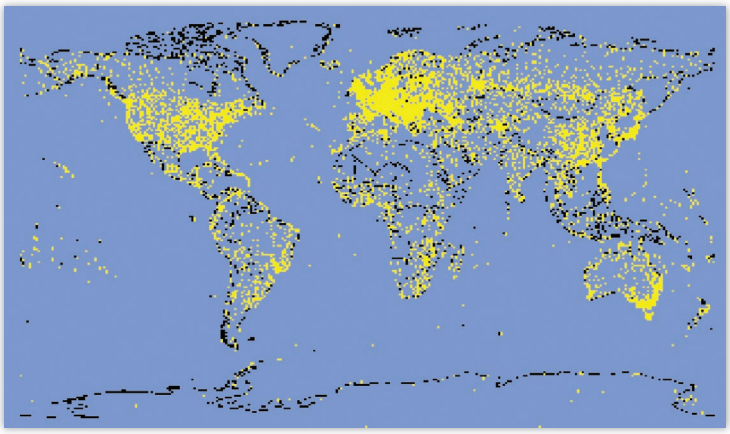
NCDC has created an online interface directing users to the key data and information which are most useful in responding to and addressing disasters and hazards - both natural and not, on local and regional scales, nationally and internationally. The url for the online interface is:
http://lwf.ncdc.noaa.gov/oa/climate/intl-hazards.html


National Oceanic and Atmospheric Administration

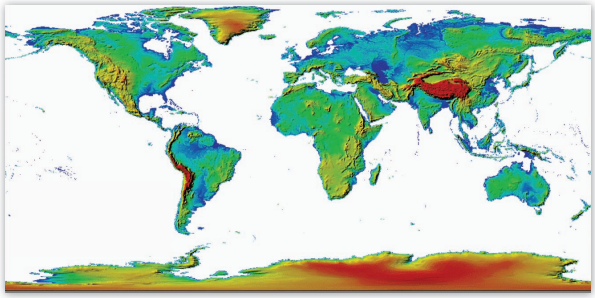
NESDIS/NCDC International Hazard Support Capabilities

Global Historical Climate Network Monthly Temperature and Precipitation	Global Summary of Day Data (eg. max wind speed, max/min temps, precip, snow depth, etc)	DMSP SSM/I Products (surface wetness, snow cover, temperature)	NNDC Climate Data Online (spatial, temporal selection of in-situ data)
Extreme Weather and Climate Events	Climate Monitoring Reports and Analyses	Monthly Climate Watch Reports and Analyses	Monthly Climate in Historical Perspective
Hurricanes in Historical Perspective	Extreme Precipitation Events	Temperature Extremes and Drought	Tornadoes in Historical Perspective
Worldwide Weather and Climate Events	Billion Dollar U.S. Weather Disasters 1980 - 2001	Global Climate Change	Historical El Nino / La Nina Information
Historical Global Temperature and Precipitation Extremes	U.S. Storm Events	U.S. Historical Radar Composite Maps	Satellite Historical Images/Movies of Significant Events
NCDC Technical Reports	Get / View On-Line Climate Data (on-line data "catalog")	Get / View On-Line Satellite Data	Get / View On-Line Radar Data
NCDC Product and Services Guide	POES Satellite Data and Products	GOES Satellite Data and Products	Global CARDS Upper Air Data -- eg. for air dispersion models

U.S. ARMY GLOBAL PRECIPITATION CLASSIFICATION PROJECT

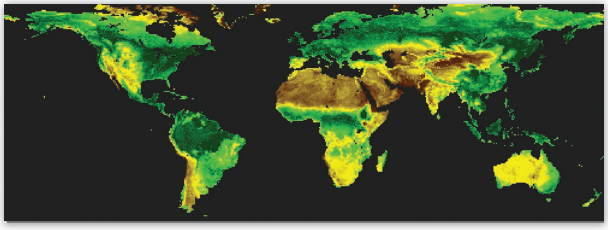


Calibration for the model developed by NCDC to map precipitation statistics for the US Army Topographic Engineering Center for the Global Precipitation Classification Project was completed and preliminary precipitation maps were generated for the contiguous US. The model uses daily precipitation data, the NDVI



(Normalized Difference Vegetation Index), and topography to estimate precipitation statistics.

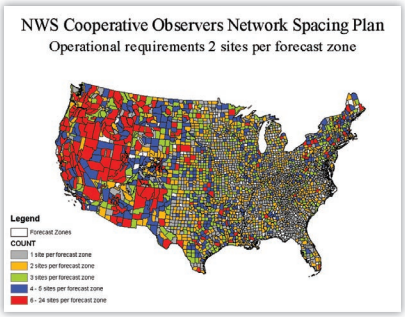
The initial maps for selected months were compared to maps produced for the US Climate Atlas using PRISM

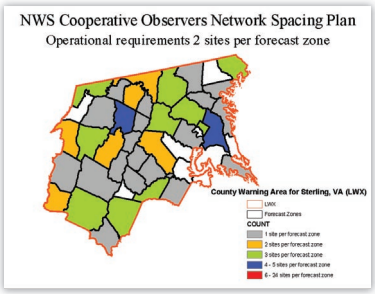


(Parameter-Regressions on Independent Slopes Model) and the results were very encouraging. Although the maps will undergo more detailed examination, this initial comparison provided the first indication that the method, data compilation, programs, and ArcView scripts were working correctly and producing reasonable results.

NWS SPACING STUDY

NCDC completed a spacing study for the NWS to determine the optimum distribution of sites for their COOP Observer modernization initiative. Using operational and climate verification requirements from several





Federal agencies, NCDC used GIS tools to provide pictorial information for use in their decision making process.

CD-ROM AND WEB PAGE FOR AFGHANISTAN AND SURROUNDING AREAS

NCDC developed a CD-ROM product which included a portion of the new web system providing data access and describing the climatology of Afghanistan and surrounding countries. The online system links to numerous online data sources and information concerning offline data sources. The key part of the system is an interactive map of the area which links to numerous climatological summaries, developed in the Federal Climate Complex (FCC) by the Air Force Combat Climatology Center (AFCCC), the United States Navy, and NCDC. The CD-ROM provides direct access (without Internet connection) to the station and country climate summaries and to satellite derived products. The url for the web site is:

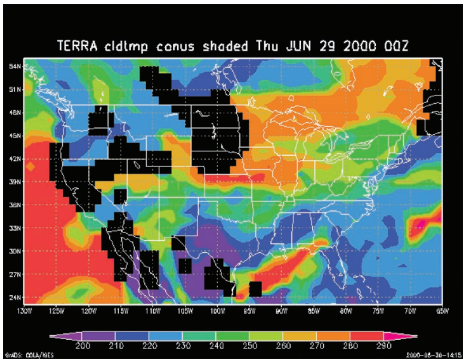
http://lwf.ncdc.noaa.gov/noaamil/afghan/

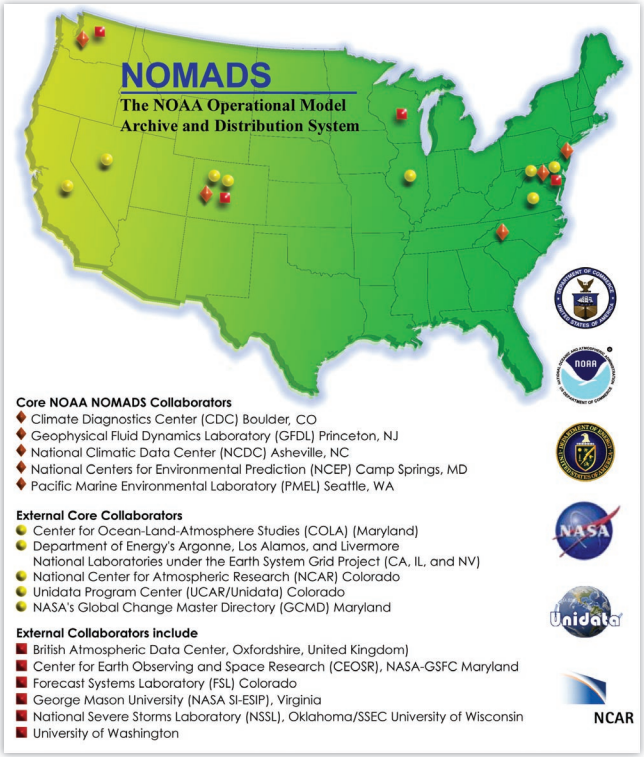
Copies of the CD-ROM were built at NCDC and are available upon request.

NOMADS

To address a growing need for remote access to high volume numerical weather prediction and global climate models and data, NCDC, along with the National Centers for Environmental Prediction (NCEP) and the Geophysical Fluid Dynamics Laboratory (GFDL), initiated the NOMADS project. NOMADS addresses model data access needs as outlined in the U.S. Weather Research Program (USWRP) Implementation Plan for Research in Quantitative Precipitation Forecasting and Data Assimilation to "redeem practical value of research findings and facilitate their transfer into operations." The NOMADS framework was also developed to facilitate climate model and observational data inter-comparison issues as discussed in documents such as the Intergovernmental Panel on Climate Change (IPCC 1990, 1995, 2001) and the U.S. National Assessment (2000). NOMADS is being developed as "A Unified Climate and Weather Archive" so that users can make decisions about their specific needs on time scales from days (weather), to months (El Niño), to decades (global warming).

NOMADS is a network of data servers using established and emerging technologies to access and integrate model and other data stored in geographically distributed repositories in heterogeneous formats. NOMADS enables the sharing and inter-comparing of model results and is a major collaborative effort, spanning multiple Government agencies and academic institutions. The data available under the NOMADS framework include model input and Numerical Weather Prediction (NWP) gridded output from NCEP, and Global Climate Models (GCM) and simulations from GFDL and other leading institutions from around the world.



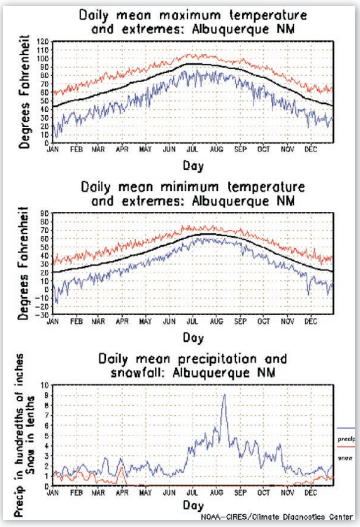


The goals of NOMADS are to:

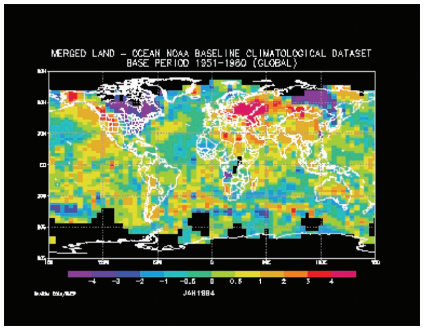
- improve access to GCM and NWP model output and provide the observational and model data assimilation products for regional model initialization and forecast verification,
- improve operational weather forecasts,
- develop linkages between the research and operational modeling communities and foster collaborations between the climate and weather modeling communities,
- promote product development and collaborations within the geo-science communities (ocean, weather, and climate) to study multiple earth systems using collections of distributed data under a sustainable system architecture.

The NOMADS framework is actively partnering with existing and development activities including CLASS, the National Oceanographic Partnership Program's (NOPP) National Virtual Ocean Data System (NVODS), the Department of Energy's Earth System Grid (ESG), and

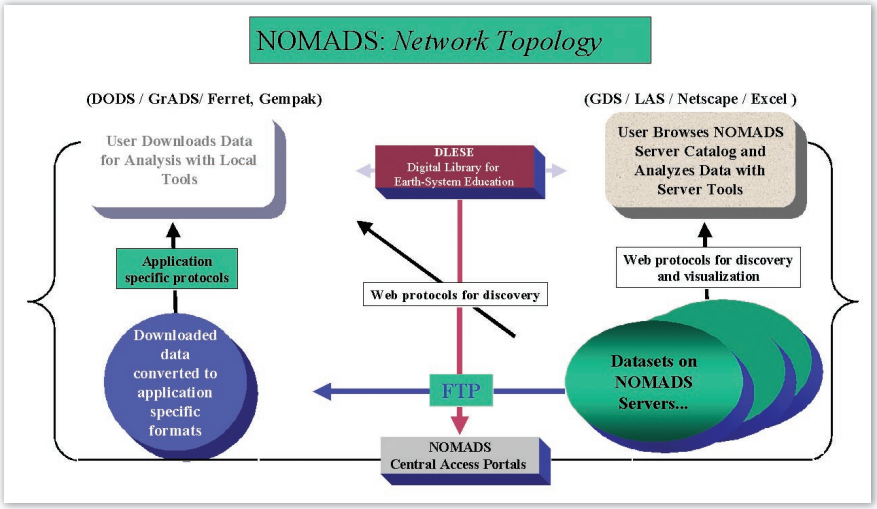
the Thematic Real-time Environmental Data Distributed Services (THREDDS) project being developed through the National Science Foundation and Unidata. To ensure that Agency and Institutional requirements are being met, the NOMADS collaborators have established Science and Technical Advisory Panels. These newly established panels would ensure the NOMADS system and metadata architecture could provide necessary inter-operability and would develop data archive requirement recommendations to NOAA.



NOMADS fosters system inter-operability by integrating legacy systems, emerging technologies, and existing metadata conventions used for models and observational data. NOMADS relies on local decisions about data holdings. Loosely combining legacy systems, while developing new ways to support data access to valuable data, permits NOMADS to work on the cutting edge of distributed data systems. In this effort, no one institution carries the weight of data delivery since data are distributed across the network and served by the institutions that developed the data. The responsibility for documentation falls on the data generator, with the Advisory Panels ensuring overall quality, ensuring systems standards, and determining which NOMADS data are required for long-term storage. Further, NOMADS in no way precludes the need for national centers to maintain and support long-term archives. In fact, NOMADS and secure data archives are mutually supportive and necessary for long-term research. The primary science benefit of the NOMADS framework is that it enables a feedback mechanism to tie Government and university research directly back to the NOAA operational communities, numerical weather prediction quality control and diagnostics processes at NCEP, and climate model assessments and inter-comparisons from around the world.



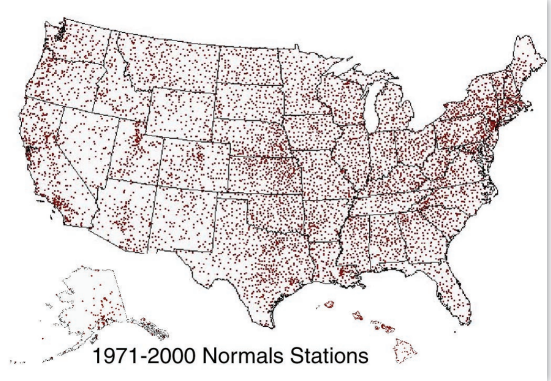
Both researchers and policy-makers alike now expect our national data assets to be easily accessible and interoperable with each other, regardless of their physical location. As a result, an effective interagency distributed data service requires coordination of data infrastructure and management extending beyond traditional organizational boundaries. Under NOMADS and its collaborators, NOAA will be at the forefront of a worldwide-distributed data-serving network. This will allow users at any level, to obtain weather and climate information. This will allow the users to make better, informed decisions about how nature will impact their future, either in their life or in their business decisions. For an example of a NOMADS web site see the GFDL NOMADS server at: http://www.nomads.gfdl.noaa.gov.



NEW PRODUCTS FOR 2001

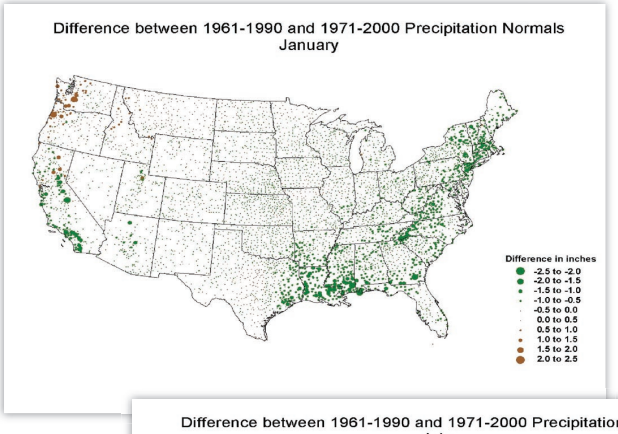
1971-2000 CLIMATE NORMALS

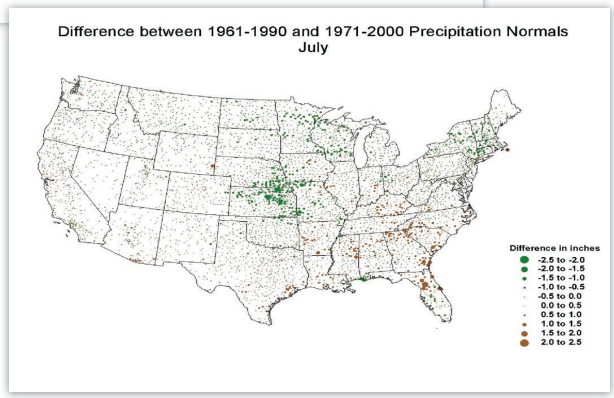
NCDC has a responsibility to fulfill the mandate of Congress "... to establish and record the climatic conditions of the United States." This mandate to describe the climate was combined with guidelines established through international agreement which requires the calculation of 'climatological normals.' A climatological normal is the average value of a meteorological element over 30 years. Many WMO members, including the United States, update their normals at the completion of each decade.



The normal climate helps in describing the climate and is used as a base to which current conditions can be compared. Every ten years, NCDC computes new thirty-year climate normals for selected temperature and precipitation elements for a large number of U.S. climate and weather stations. These normals are summarized in daily, monthly, divisional, and supplementary normals products. Monthly and daily normals were computed for nearly 8000 stations in the United States, Puerto Rico, the Virgin Islands, and the United States Pacific Islands. This represents an increase of over 15 percent in the number of stations from the previous 1961-1990 edition.

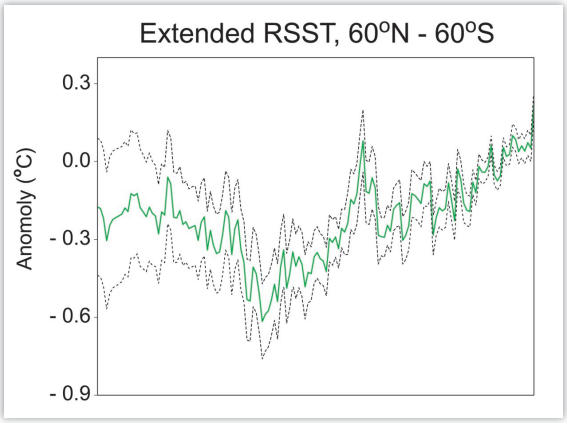
The digital Normals files may be ordered online through the NCDC Online Store. Digital publication files (in PDF format) of the daily and monthly Normals are also available. The new Normals will be used by NOAA's NWS in the daily and monthly climate reports, beginning January 2002. Additional information on the 1971-2000 climate normals is available by going to: http://www.ncdc.noaa.gov/normals.html.





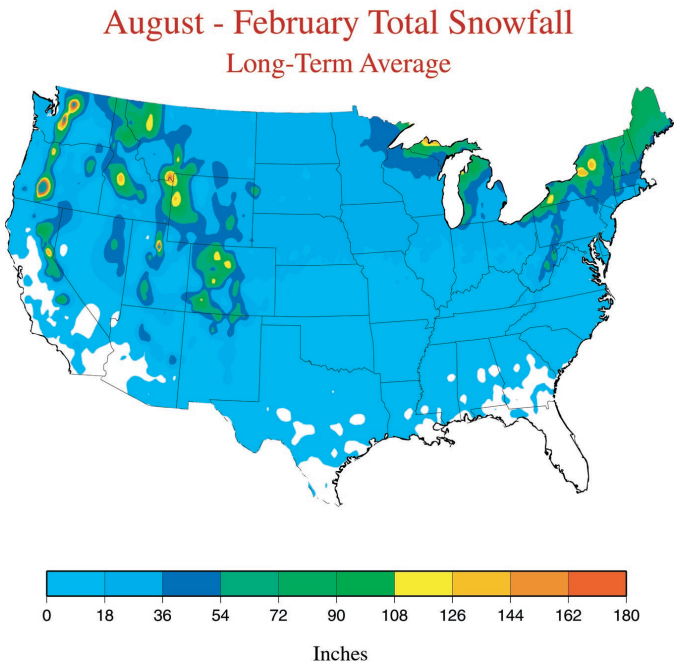
EXTENDED SEA SURFACE TEMPERATURE ANALYSIS

Since the oceans cover most of the earth's surface, the sea surface temperature (SST) is an important component of global climate. A statistical reconstructed SST based on observations from ships is currently available at NCDC for the period 1950-2001. A new extended reconstructed SST has been developed at NCDC for the period beginning 1854. The analysis produces a global SST map for each month and an error estimate for the analysis. The figure shows the average annual SST anomalies between 60S and 60N with 95% confidence intervals.

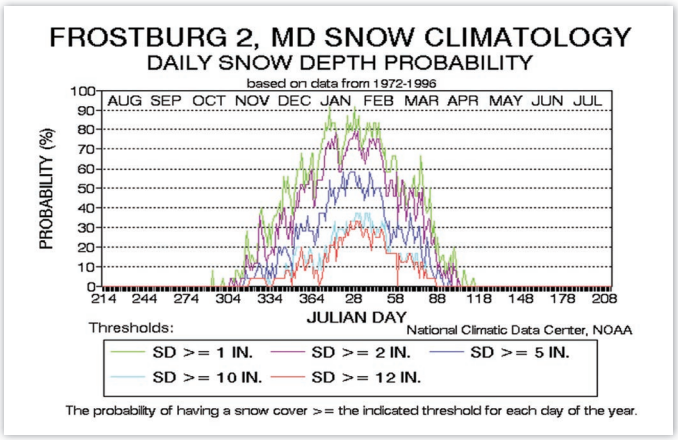


COMPREHENSIVE U.S. SNOW CLIMATOLOGIES

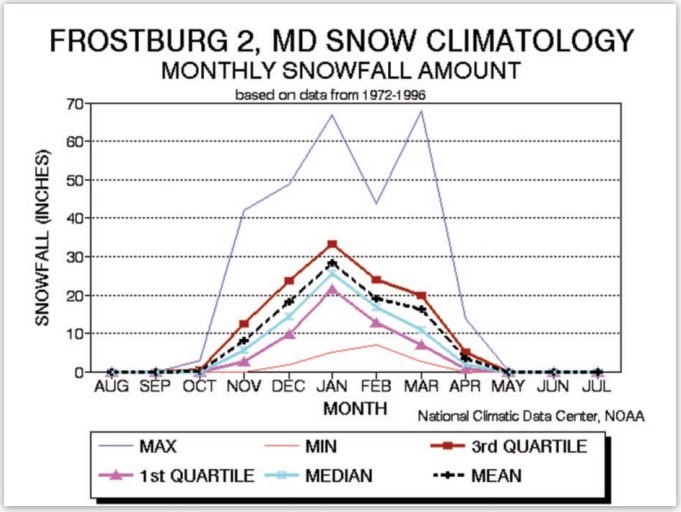
During FY 2001, the Federal Emergency Management Agency (FEMA) funded NCDC to update U.S. Snow Climatologies. The funding enabled NCDC to process data through December 2000, convert the software to be run operationally, and put the database online. NCDC's U.S. Snow Climatology web page can be accessed at: http://lwf.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html



The snow climatology data base consists of snowfall and snow depth statistics for several thousand stations in the COOP Network. Stations in the lower 48 States and Alaska were analyzed. A suite of statistics (mean, median, first and third quartiles, extremes [both amounts and dates of occurrence], and frequencies/probabilities) was generated for several climatic parameters. The specific statistics that were computed vary with parameter, but the number of years with non-missing data (NYRS) was computed for each parameter. The beginning and ending years and NYRS information are crucial for any inter-station or inter-seasonal comparisons the user might wish to make.



A daily climatology and a monthly/seasonal climatology were created for each station. The statistics for the daily climatology were generated for each day from the years of data available for the day. The statistics for the monthly/seasonal climatology were generated from year-month or year-season sequential values. The climatic parameters include number of days with snowfall and snow cover, dates of first and last occurrence of daily snowfall, snow frequencies and return periods, and daily, monthly and seasonal total snowfall amount.



These snow climatologies enable NOAA to put snow events into historical perspective, support operational snow activities of the NWS, and aid FEMA in making disaster declarations for record or near-record snowstorms.

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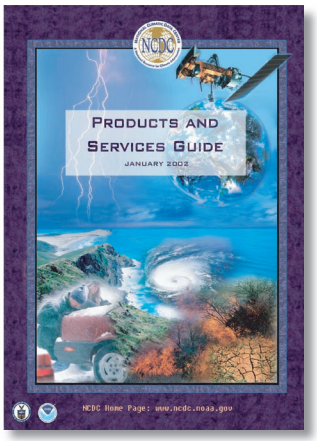

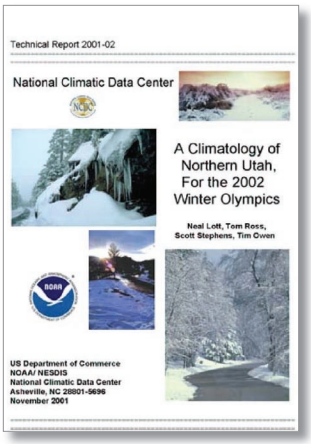

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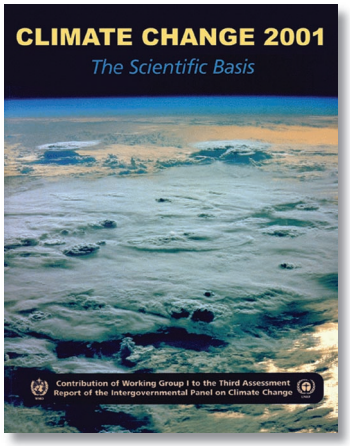

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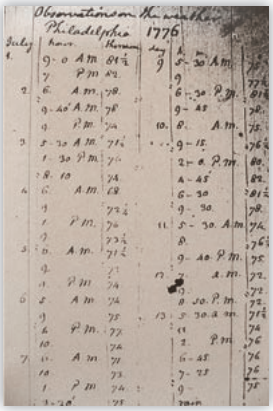
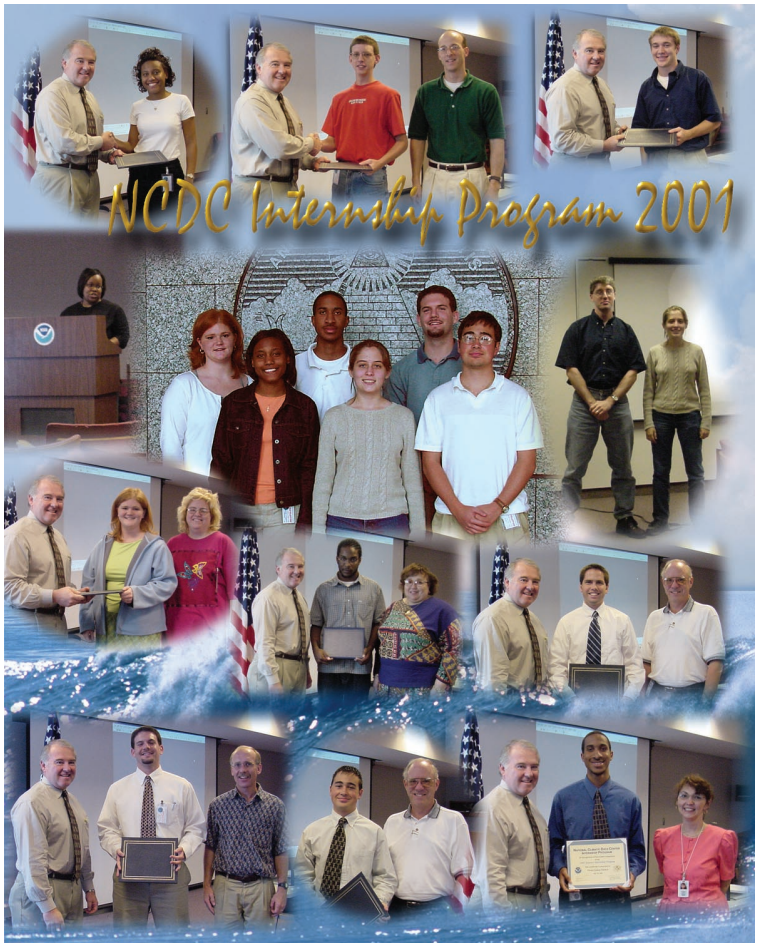


NCDC has developed a vigorous Outreach Program in the local community and across the nation. NCDC's outreach effort is, in part, to inform our users of the rich and varied history of climatology and meteorology. Weather and climate records have their roots in one of the earliest observers, Rev. John Companius Holm who made the first known regular weather observation in North America near Wilmington, Delaware in 1644. Almost 100 years later, Benjamin Franklin tracked a hurricane while serving as Postmaster General. Franklin and Thomas Jefferson loom almost as large in the history of American weather and climatology as they do in the history of our country. George Washington, an avid weather watcher, made daily weather observations in his diary up to the day before his death.

Another aspect of Outreach is to spread an awareness of NCDC's mission throughout our local community through participation in local education and civic activities. NCDC works cooperatively with local high schools in job vocational programs which allow students to work part time at the Center during the school year. In 2001, NCDC expanded its summer intern program with 12 college students working on various projects at the Center. NCDC also has extensive outreach opportunities at the middle and elementary school levels by hosting career days and various tours and open house activities. NCDC personnel are involved in the community by speaking at educational and civic groups functions with many of those groups visitng the Center each year. In conjunction with NESDIS and other NOAA agencies, NCDC routinely exhibits at various scientific and professional conferences each year.



Outreach accomplishments for 2001:

- 2001 NCDC Internship Program
- Career and Recruitment fairs
- Community Activities-Excellence in Public Service & Combined Federal Campaign
- Big Brothers and Big Sisters of Western North Carolina Mentors and Matches Program
- Educational Alliances - Asheville Chamber of Commerce Partners in Education & Asheville City High School Business Alliance

In addition, NCDC has developed a Diversity web page which highlights many of the activities of NCDC in the area of supporting and promoting diversity in the workplace. The address is: http://www.ncdc.noaa.gov/noaaonly/diversity/ The NCDC Diversity page is accessible by all NOAA employees and is located on the main page under "About NCDC."

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AFCCC ..... Air Force Combat Climatology Center
ASOS ..... Automated Surface Observing System
AVHRR ..... Advanced Very High Resolution Radiometer
CCl ..... Commission on Climatology
CDMP ..... Climate Database Modernization Program
CLASS ..... Comprehensive Large Array-data Stewardship System
COOP ..... Volunteer Cooperative Observer
CPC ..... Climate Prediction Center
CRN ..... Climate Reference Network
CSC ..... Coastal Services Center
DMSP ..... Defense Meteorological Satellite Program
DOC ..... United States Department of Commerce
EOS ..... Earth Observing System
EROS ..... Earth Resources Observation System
ESG ..... Earth System Grid
FCC ..... Federal Climate Complex
FEMA ..... Federal Emergency Management Agency
GCM ..... Global Climate Models
GFDL ..... Geophysical Fluid Dynamics Laboratory
GHCN ..... Global Historical Climatology Network
GIS ..... Geographical Information System
IE ..... Image Entry
IMC ..... Information Manufacturing Corporation
IPCC ..... Intergovernmental Panel on Climate Change
NASA ..... National Atmospheric and Space Administration
NCDC ..... National Climatic Data Center
NCEP ..... National Centers for Environmental Prediction
NDVI ..... Normalized Difference Vegetation Index
NESDIS ..... National Environmental Satellite, Data, and Information Service
NEXRAD ..... Next Generation Radar - Doppler Radar
NGDC ..... National Geophysical Data Center
NOAA ..... National Oceanic and Atmospheric Administration
NODC ..... National Oceanographic Data Center
NOMADS ..... NOAA Operational Model Archive and Distribution System
NOPP ..... National Oceanographic Partnership Program
NPOESS ..... National Polar-orbiting Operational Environmental Satellite System
NPP ..... NPOESS Preparatory Project
NVODS ..... National Virtual Ocean Data System
NWP ..... Numerical Weather Prediction
NWRC ..... National Weather Records Center
NWS ..... National Weather Service
NYRS ..... Years with Non-Missing Data
PRISM ..... Parameter-Regressions on Independent Slopes Model
RCC ..... Regional Climate Center
REDTI ..... Residential Energy Demand Temperature Index
SPI ..... Standardized Precipitation Index
SST ..... Sea Surface Temperature
THREDDS ..... Thematic Real-time Environmental Data Distributed Services
USDA ..... United States Department of Agriculture
USGS ..... United States Geological Survey
USHCN ..... United States Historical Climatology Network
USWRP ..... United States Weather Research Program
WDC ..... World Data Center
WMO ..... World Meteorological Organization
WPA ..... Works Progress Administration
WSR-88D ..... Weather Service Doppler Radar
WSSRD ..... Web, Search, Store, Retrieve, Display

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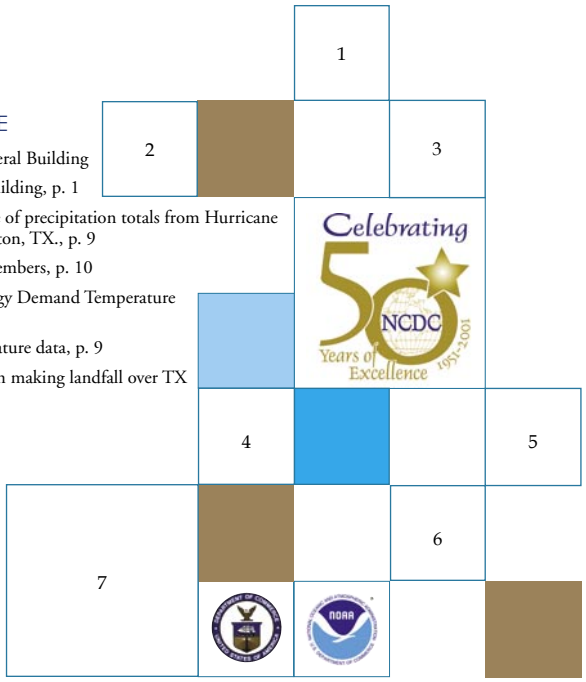

The NCDC Mission:

To be responsible for the stewardship of and access to the Nation's climate-related data and information, and to be responsible for assessing and monitoring the National and global climate.